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Biology Standard  
B.8.a.



# Differential Survival of Organisms

## California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

### The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency  
California Natural Resources Agency  
Office of the Secretary of Education  
California State Board of Education  
California Department of Education  
California Integrated Waste Management Board

### Key Leadership for the Education and Environment Initiative:

**Linda Adams**, Secretary, California Environmental Protection Agency  
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**Mark Leary**, Executive Director, California Integrated Waste Management Board  
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### Key Partners:

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## **Lesson 1    Where and Why of Species Distribution**

<b>1</b>	Sea Surface Temperatures—North America . . . . .	2
<b>2</b>	Ocean Nitrates—North America . . . . .	3
<b>3</b>	Ocean Phosphates—North America . . . . .	4
<b>4</b>	Pacific Ocean Upwellings . . . . .	5
<b>5</b>	Kelp Forests . . . . .	6
<b>6</b>	Historical Distribution of Sea Otters . . . . .	7

## **Lesson 2    Patterns of Change over Time**

<b>7</b>	Phenotype Variation in Rock Pocket Mice . . . . .	8
<b>8</b>	Predation and Guppy Body Size . . . . .	9
<b>9</b>	Map of Sparrow Body Size Variations . . . . .	10

## **Lesson 3    Selection Pressures Drive Evolution**

None required for this lesson.

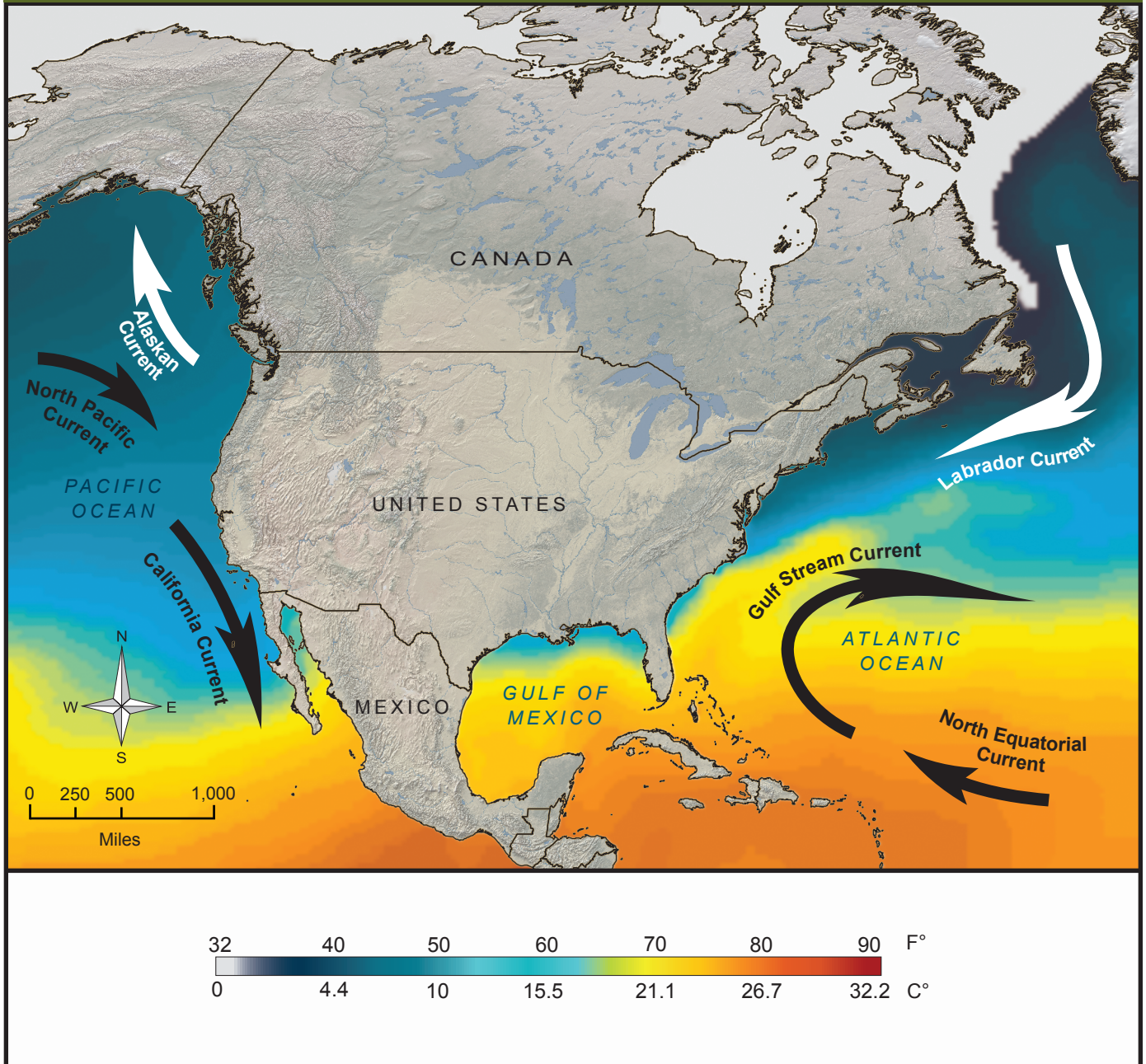
## **Lesson 4    Natural Factors and Human Activities Change Environments**

<b>10</b>	Ocean Systems Diagram . . . . .	11
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## **Lesson 5    Human Activities, Natural Factors, and Differential Survival**

<b>11</b>	Current Sea Otter Distribution . . . . .	12
<b>12</b>	Effects of Human Activities on Sea Otters . . . . .	13

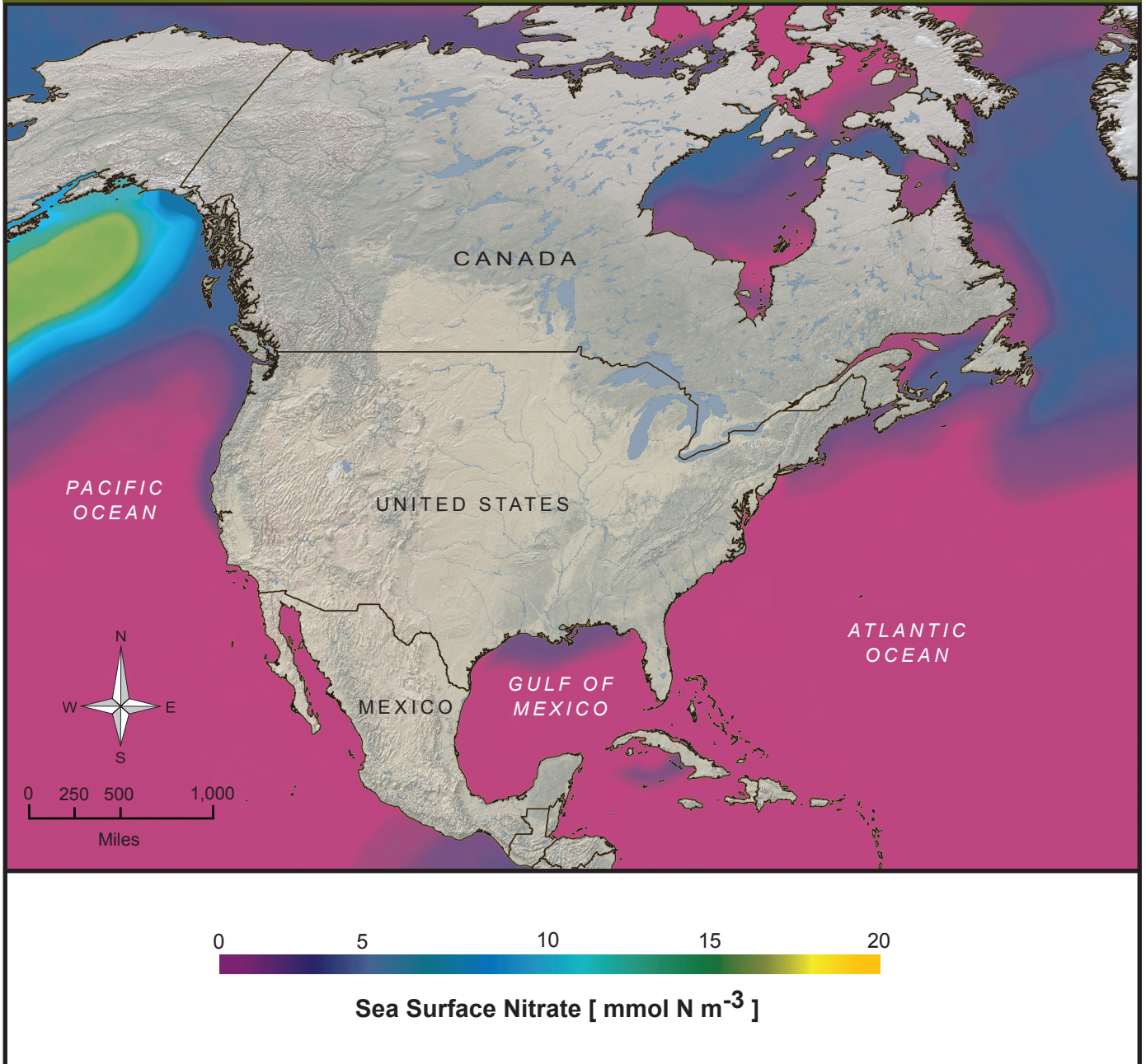
## VA #1 Sea Surface Temperatures—North America



Source: National Oceanic and Atmospheric Administration (NOAA)/National Environmental Satellite, Data, and Information Service (NESDIS)



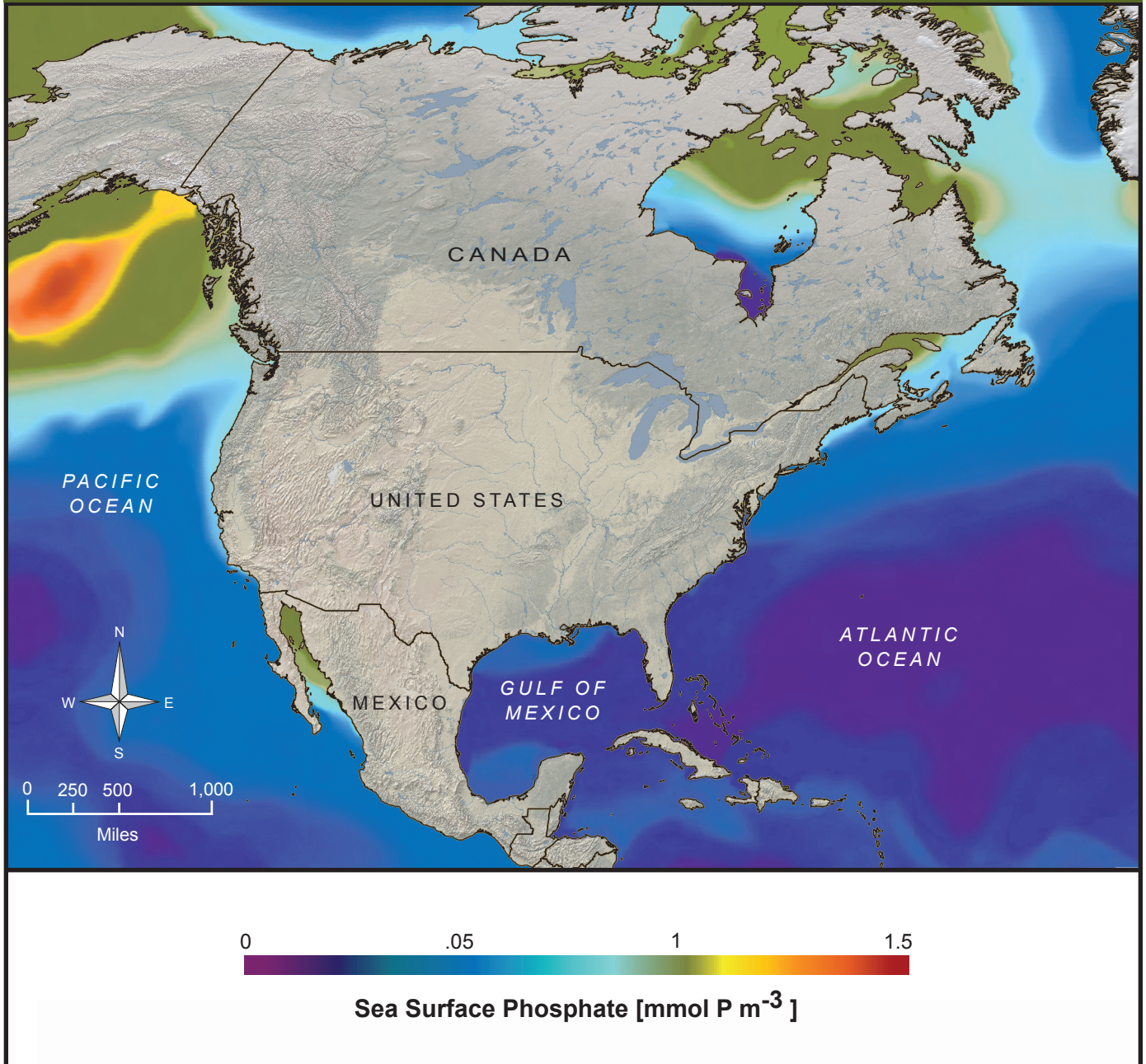
## VA #2 Ocean Nitrates—North America



Source: National Oceanic and Atmospheric Administration (NOAA)/National Environmental Satellite, Data, and Information Service (NESDIS)



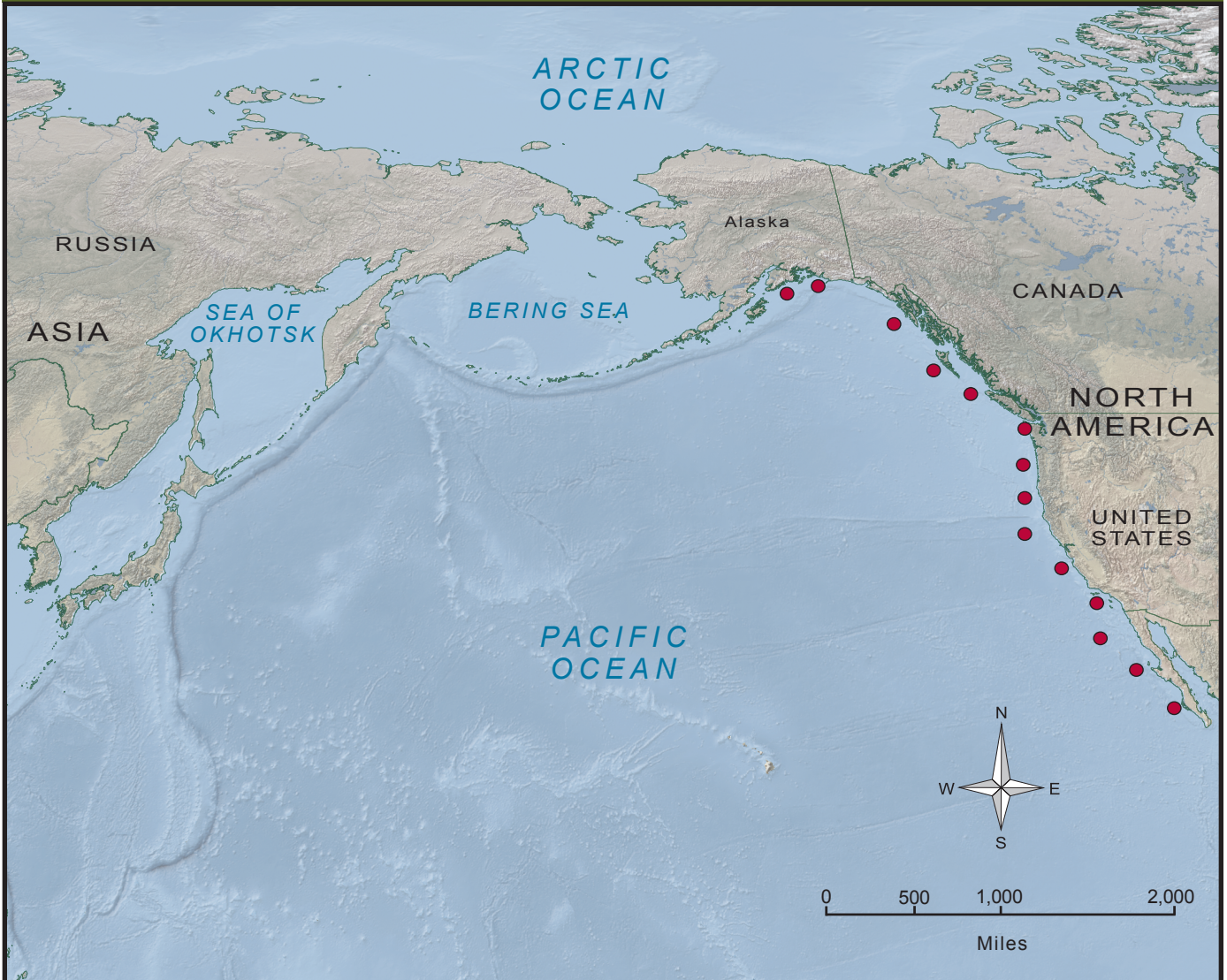
## VA #3 Ocean Phosphates—North America



Source: National Oceanic and Atmospheric Administration (NOAA)/National Environmental Satellite, Data, and Information Service (NESDIS)



## VA #4 Pacific Ocean Upwellings



● Locations of ocean upwellings



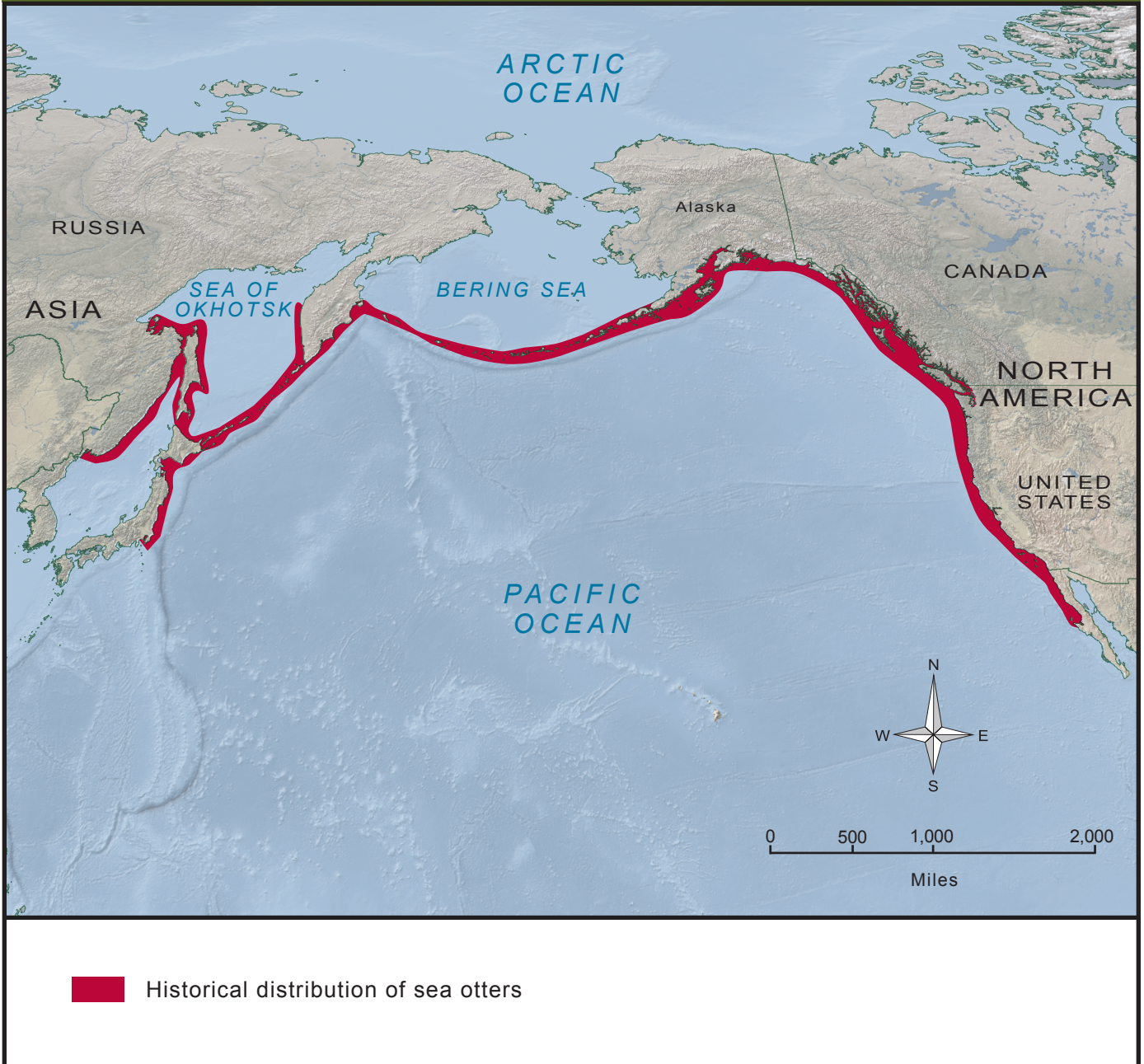
## VA #5 Kelp Forests



 Distribution of kelp forests



## VA #6 Historical Distribution of Sea Otters





## VA #7 Phenotype Variation in Rock Pocket Mice



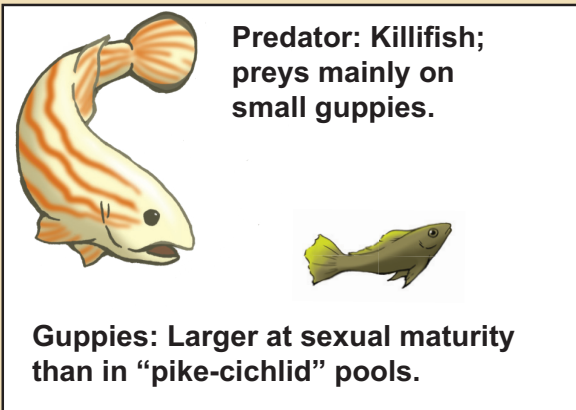
Light and dark rock pocket mice (*Chaetodipus intermedius*) from the Pinacate area of Arizona on light and dark substrate (rocks).



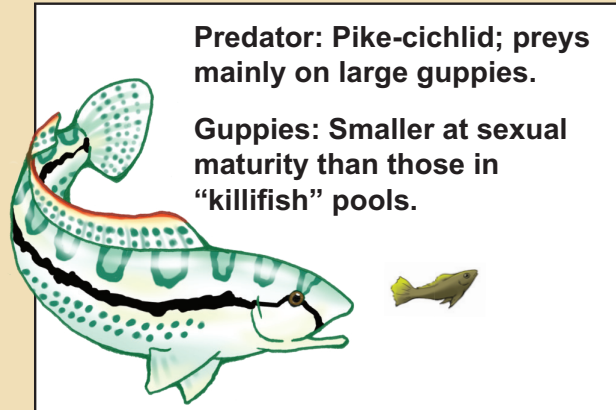


## VA #8 Predation and Guppy Body Size

### Pool 1–Killifish and Guppies

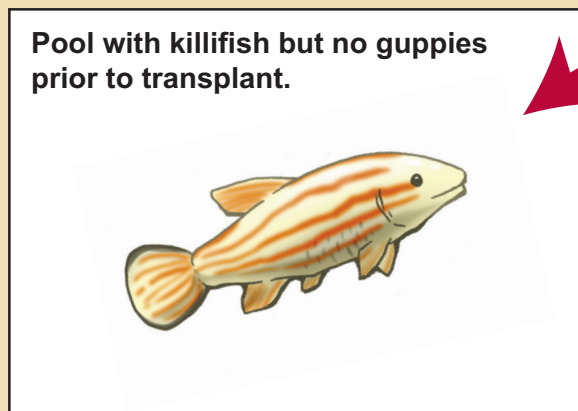


### Pool 2–Pike-cichlid and Guppies

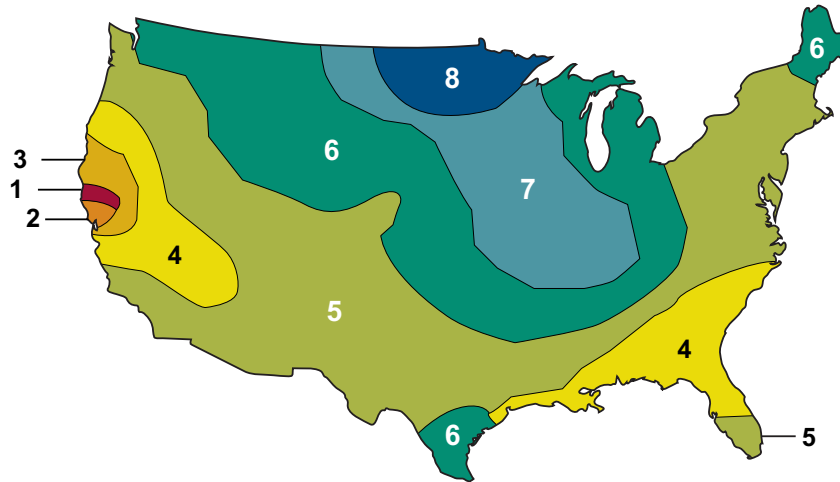


**Experimental  
transplant of  
guppies**

### Pool 3–Killifish with no Guppies



## VA #9 Map of Sparrow Body Size Variations



### AVERAGE MALE SPARROW SIZE



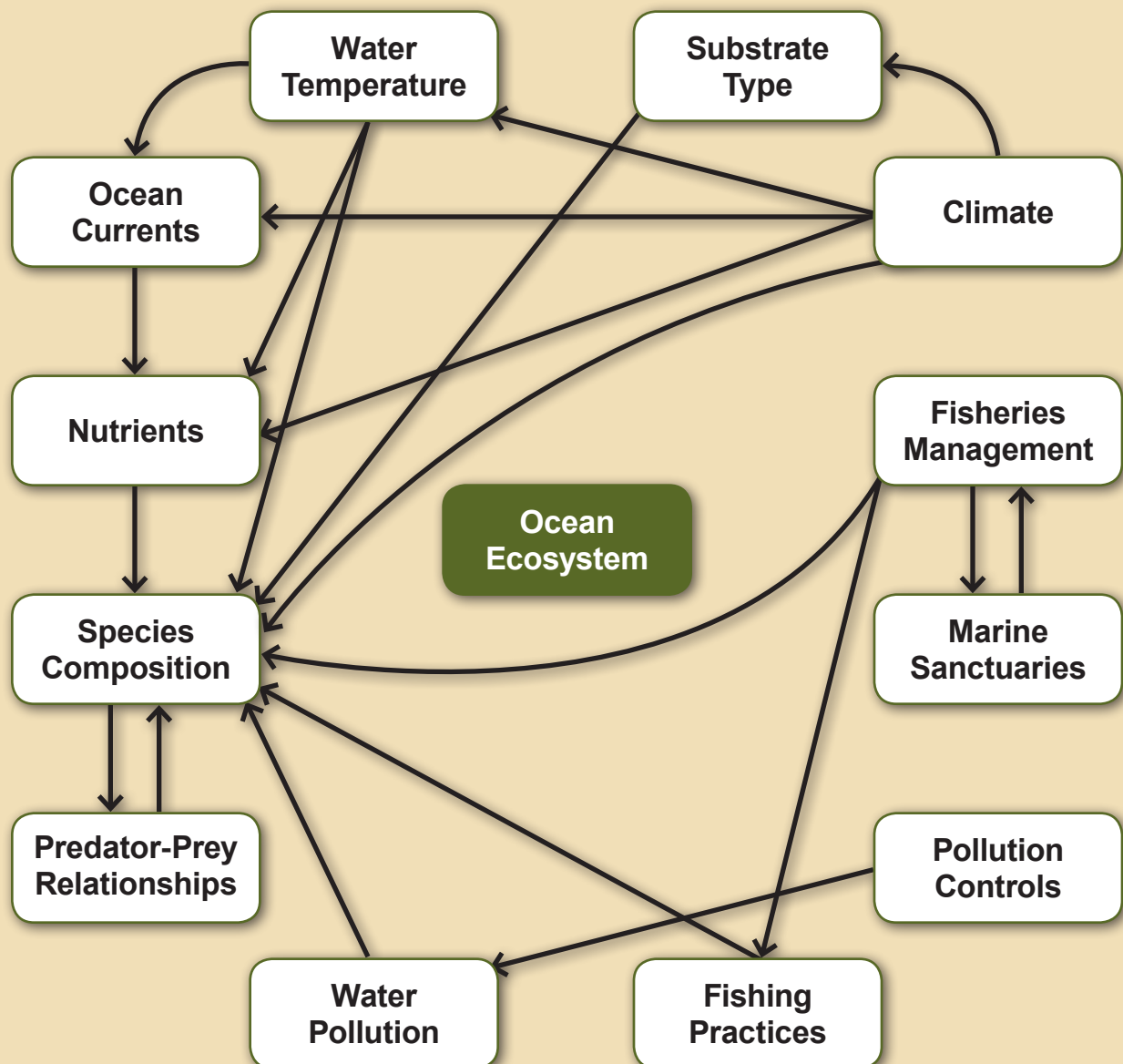
### Sparrow Size

This map shows how body size of house sparrows varies across North America according to climate. Larger sparrows live in colder areas because their smaller surface-area-to-volume ratios help them retain heat.

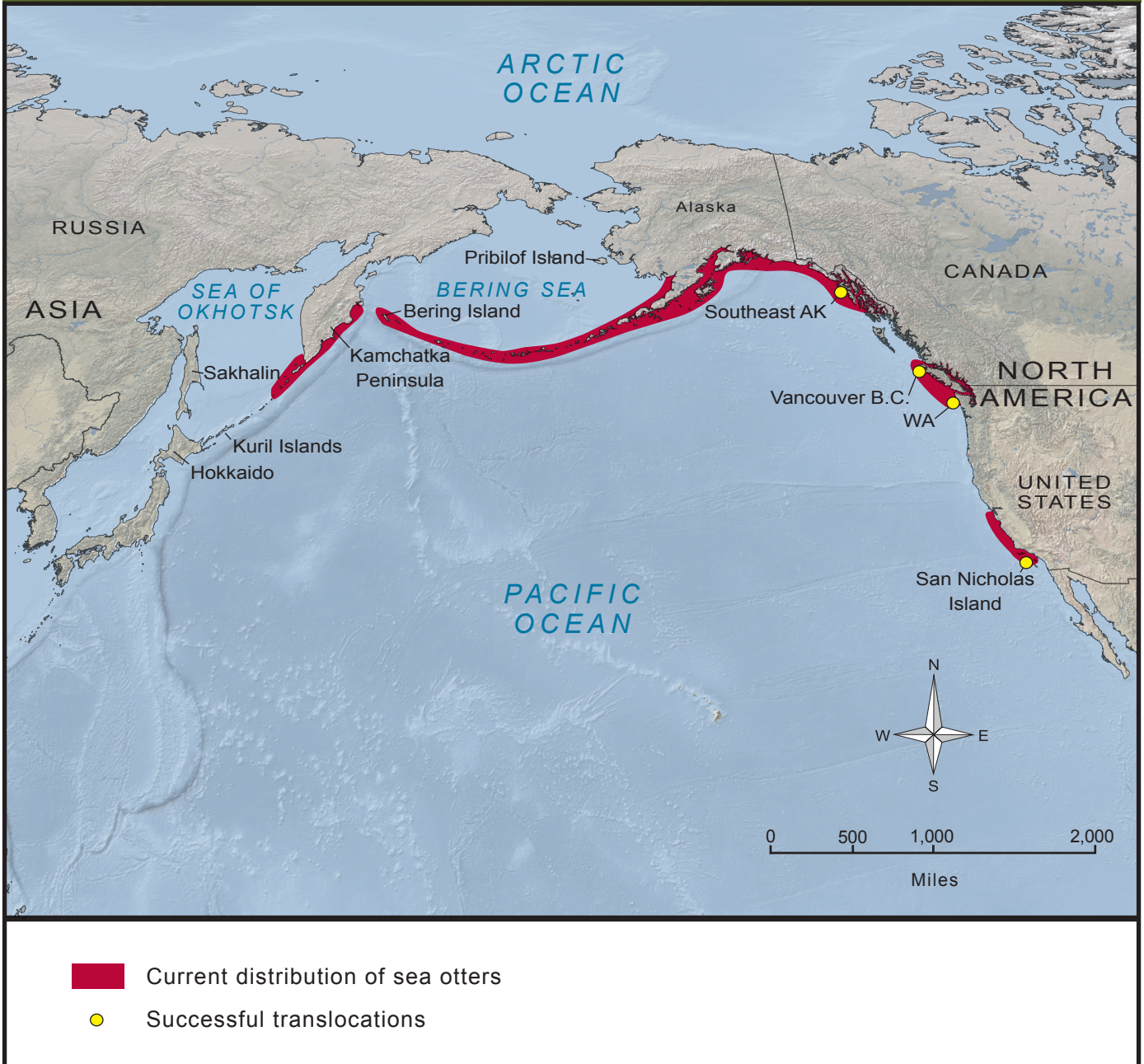
As this map shows, sparrows in colder places tend to grow larger than sparrows in warmer locales. These differences likely represent microevolutionary change, meaning that populations descended from the same ancestors display different average phenotypes.



## VA #10 Ocean Systems Diagram



## VA #11 Current Sea Otter Distribution





**VA #12 Effects of Human Activities on Sea Otters**

<b>Human Activity</b>	<b>Effects on the Survival of Sea Otters</b>	<b>Adaptations That Might Increase Sea Otter Survival</b>
<b>Habitat degradation</b>		
<b>Water pollution</b>		
<b>Boating (Trauma from human activity)</b>		
<b>Legislation</b>		









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